American University of Beirut

Department of Computer Science

CMPS 251 - Numerical Analysis & Computing

MatLab Assignment 1 - due: Friday, March 8

You should submit your answer in one file, named "your_name.m", containing all your codes

Exercise 1 The Fibonacci number, F_n, is defined by the following recurrence relation:

$$\begin{cases} F_n = F_{n-1} + F_{n-2} \\ F_1 = 1, F_2 = 1 \end{cases}$$

1) Write a MatLab function "Fibo1" that calculate F_n. Test your function with different values of n. Test your program for different values of n

2) Write a MatLab function "Fibo1" that takes inputs N, and finds n_0 such that $F_{n_0} < N$, and $F_{n_0+1} > N$ (use a while loop). Test your program for $N = 1000$

3) Write a script which finds the sum of the first 40 Fibonacci numbers $F_n, 1 \leq n \leq 40$, for which F_n is divisible by either 2 or 5

For example, the first Fibonacci number to be included in the sum will be $F_3 = 2$, and the second Fibonacci number to be included in the sum will be $F_5 = 5$. Use a for statement but now add the necessary relational and logical operations, an if, and also a "fibsum" summation variable which is initialized outside the loop and appropriately incremented inside the loop. You should find the Matlab built-in function "mod" helpful

Exercise 2 Suppose a computer system uses 1 bit for sign, p bits for a mantissa and e bits exponent, in the representation of

$$x = (-1)^s \times b^e \times (1.f)_b$$

in the b-base system. Complete the MatLab program "float.m" , that generates the positive elements of such system, called $\mathbb{F}(b, e, p)$. Test your program for $\mathbb{F}(2, 3, 2)$

Exercise 3 Complete the MatLab program "BackSub.m" , that takes as input an upper triangular matrix U, and a vector b, and returns the solution of the system $Ux = b$

test your program for $U = \begin{pmatrix} 1 & 2 & 6 \\ 0 & -2 & -2 \\ 0 & 0 & 1 \end{pmatrix}$, and $b = \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}$